

# 4<sup>th</sup> Lithium Supply & Markets Conference

 INDUSTRIAL  
MINERALS  
EVENTS

Frank D. Wheatley, Talison Lithium Limited

Global Trends & The Lithium Market



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## Agenda



### ■ Global Trends

- Global Trends to Watch
- Impact on Natural Resource Demand

### ■ The Lithium Market

- Lithium Demand
- Lithium Supply

### ■ Talison Lithium Limited

## Global Trends - Overview



### ■ Global Trends To Watch

- Population Growth
- Urbanization & Economic Growth
- Environment & Climate Change

### ■ Impact of Global Trends on Natural Resource Demand

- Long Term Drivers of Demand
- Natural Resource Scarcity
- Energy Security

### ■ Summary

## Global Trends To Watch - Population Growth



- 7 Billion: Global population in 2011
- 9 Billion: Global population by 2045
- How Population Grows
  - Demographic transition is driven by improvement in living conditions
  - As a result, societies transition from high birth/death rates to low birth/death rates
- Drivers of Improvement in Living Conditions
  - Agricultural science - high yield seeds
  - Chemical science - fertilizers & insecticides
  - Sanitation & clean water
  - Medical science - vaccines and antibiotics
- Case Study – Emerging Economies
  - China:                2011 – 1.4 billion                2030 – 1.5 billion                2050 – 1.4 billion
  - India:                 2011 – 1.2 billion                2030 – 1.5 billion                2050 – 1.6 billion

## Global Trends to Watch – Urbanization & Economic Growth



- 50%: Percentage of global population living in urban cities in 2011
- 60%: Percentage of global population living in urban cities in 2025
- 80%: Percentage of global GDP generated by current urban population
- 1 Billion: Number of people who will live in China's urban cities by 2030
- 3 Billion: Number of new middle-class consumers by 2030
- Shift in Economic Balance of Power
  - 2011: US is the largest global economy
  - 2020: China becomes the largest global economy
  - 2050: India overtakes the US economy
- Composition of Global GDP

● 2010:	North America - 26%	Europe - 25%	Asia - 18%
● 2030:	North America - 16%	Europe - 13%	Asia - 13%
● 2050:	North America - 10%	Europe - 8%	Asia - 46%

## Global Trends to Watch – Urbanization - China



### ■ China in 2025

- 350 Million Increase in China's urban population by 2025
- 8 Number of megacities with populations > 10 million people
- 23 Number of cities with populations > 5 million people

Shenzhen 1982



Shenzhen 2007

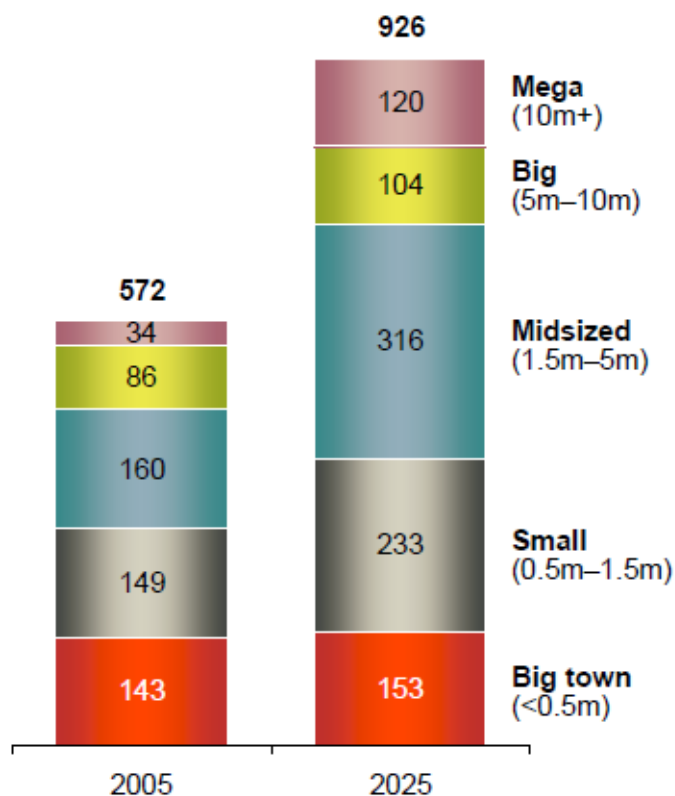


Sources: McKinsey, The Chinese UPLA Urban Planning Network (Images)

## Global Trends to Watch - Urbanization - China



**China's urban population by city size**  
(Millions of people)



**China's expected urbanisation in 2025**



Source: McKinsey Global Institute, March 2009, "Preparing for China's Urban Billion".

Sources: United Nations, McKinsey



## Global Trends to Watch – Environment & Climate Change



- Environmental issues will continue to increase in importance
- Climate change will continue to drive a carbon constrained world
- Population growth and urbanization will continue to drive energy demand
- Growth in energy consumption will in turn drive climate change and environmental impacts
- Stakeholder concern will drive global regulatory and policy action, including:
  - Improvements in energy efficiency
  - Reduction in carbon emissions
  - Reduction in use of high carbon energy sources
  - Evolution to low carbon energy sources
  - Shift to sustainable, renewable sources of energy

## Impact of Global Trends - Natural Resource Scarcity



- Drivers of natural resources demand
  - Population Growth
  - Urbanization & Economic Growth
  
- The world is entering an age of scarcity of both renewable and non-renewable resources
  - Minerals
  - Energy
  - Land & Water
  
- Dimensions of Scarcity
  - Physical - supply challenge - “just not there” as opposed to “just in time”
  - Economic - volatile pricing
  - Geopolitical - protectionism / trade barriers / export controls

## Impact of Global Trends - Natural Resource Scarcity



### ■ Supply Challenge – Minerals & Metals

- Discovery of large, low cost, economic deposits has been declining
- Discovery of new deposits is becoming more challenging and expensive
- Long term production costs for extraction of resources continue to increase
- Environmental protection is contributing to increased production costs
- Environmental protection could restrict supply
- Logistics and geopolitics is also contributing to increased production costs
- Most countries rely on imported resources

### ■ Pricing – Minerals & Metals

- 100 year decline in prices has reversed in the last decade for the reasons set out above
- Energy is a particularly important part of the cost of producing resources
- Resources represent a substantial proportion of inputs to other resources
  - ◆ Energy and water costs constitute a significant proportion of extraction costs

## Impact of Global Trends - Natural Resource Scarcity



- Concerns
  - Security of supply
  - Pricing
- Response
  - Integration of supply chain
    - ◆ Acquisition of upstream suppliers
    - ◆ Mine to market strategy
  - Strategic alliance with suppliers
  - Diversification of suppliers
  - Stockpiling
  - Substitution
  - Efficiency
  - Increased supply

## Impact of Global Trends - Energy Security



- Increasing Demand
  - 30%: Increase in global energy demand over next 30 years
  - 80%: Increase in electricity demand over next 30 years
  - 40%: Electricity generation's share of global energy consumption
- Drivers of demand for energy
  - Population Growth
  - Urbanization & Economic Growth
- Global energy sources will evolve over time
- Global energy mix will grow more diverse and less carbon intensive
  - Oil will remain the world's top energy source
  - Natural gas will become the world's number 2 energy source
  - Coal will peak around 2025 and decline thereafter
  - Renewable sources of energy will continue to grow

Sources: Exxon, BP, Shell, Energy Security Leadership Council, World Energy Council



## Impact of Global Trends - Energy Security



### ■ Case Study: United States

- Concerns
  - ◆ Increasing global demand
  - ◆ Increasing reliance on the Middle East
  - ◆ Geopolitical risks
  - ◆ Oil dependence
- Response
  - ◆ Reducing demand for oil
  - ◆ Increasing domestic energy production – shale gas
  - ◆ Improving efficiency of current energy use
  - ◆ Electrification of transportation – evolve away from oil as the primary fuel
  - ◆ Research & development – deployment of new energy related technologies
  - ◆ Transparency and market efficiency

## Impact of Global Trends - Energy Security



### ■ Case Study: China

- Current and future energy demand:
  - ◆ 25%: Portion of global energy demand in 2011
  - ◆ 100%: Increase in demand for electricity by 2040
- Concerns
  - ◆ Power generation – “keeping the lights on”
  - ◆ Oil dependence
- Response
  - ◆ Improving efficiency of current energy use
  - ◆ Exploring domestic energy production
  - ◆ Control of the entire natural resource supply chain
  - ◆ Acquisition of source of supply of non-domestic natural resources

## Global Trends - Summary



### ■ Global Trends & Impacts

- Population growth and urbanization will drive demand for resources
- Resource scarcity and global competition for resources will increase
- Geopolitical and environmental issues will become more influential
- Supply response will become more challenging and costly

### ■ Response

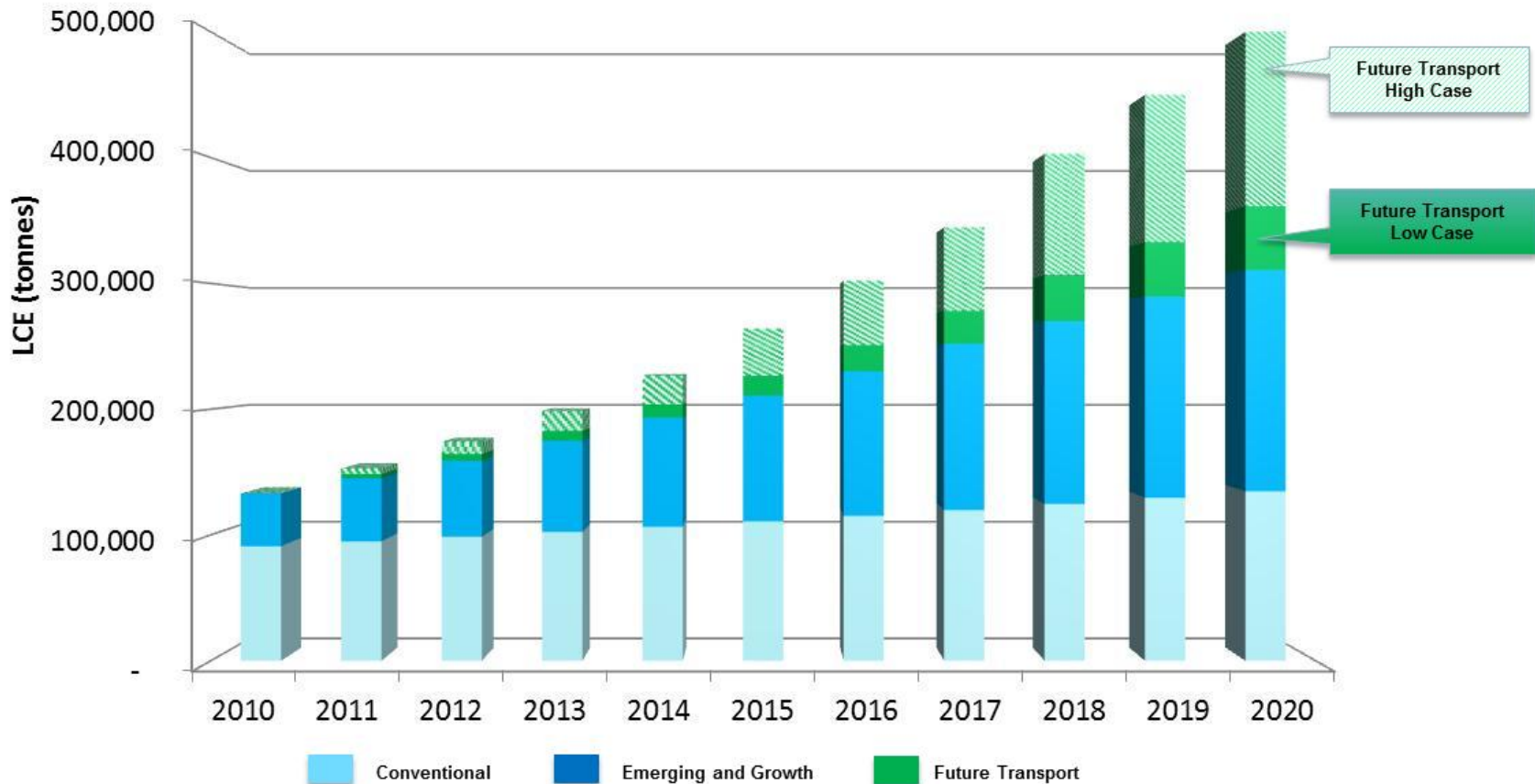
- Security of supply will take on greater importance
- Supply response will necessitate higher prices
- Resources will be used more efficiently
- Energy sources will diversify and evolve to low carbon sources
- Development and deployment of new technologies
  - ◆ Large scale storage of electricity - will facilitate renewables (wind and solar)
  - ◆ Decrease in battery costs - will facilitate electrification of transport

## Lithium Demand



- Global Trends and Lithium Demand
  - All are drivers of long term lithium demand
  
- Specifics Trends influencing Lithium Demand
  - Rapid economic development in emerging economies, especially China & India
  - Environmental issues and climate change
    - ◆ Drivers of an evolution to lower carbon, renewable sources of energy
    - ◆ Drivers of energy storage for renewables such as wind and solar energy
  - Addition of 3 billion middle-class consumers over the next 20 years, demanding:
    - ◆ Consumer goods, including automobiles and electronics
  - Research and development for new technologies and applications

## Lithium Demand



Source: Talison Lithium

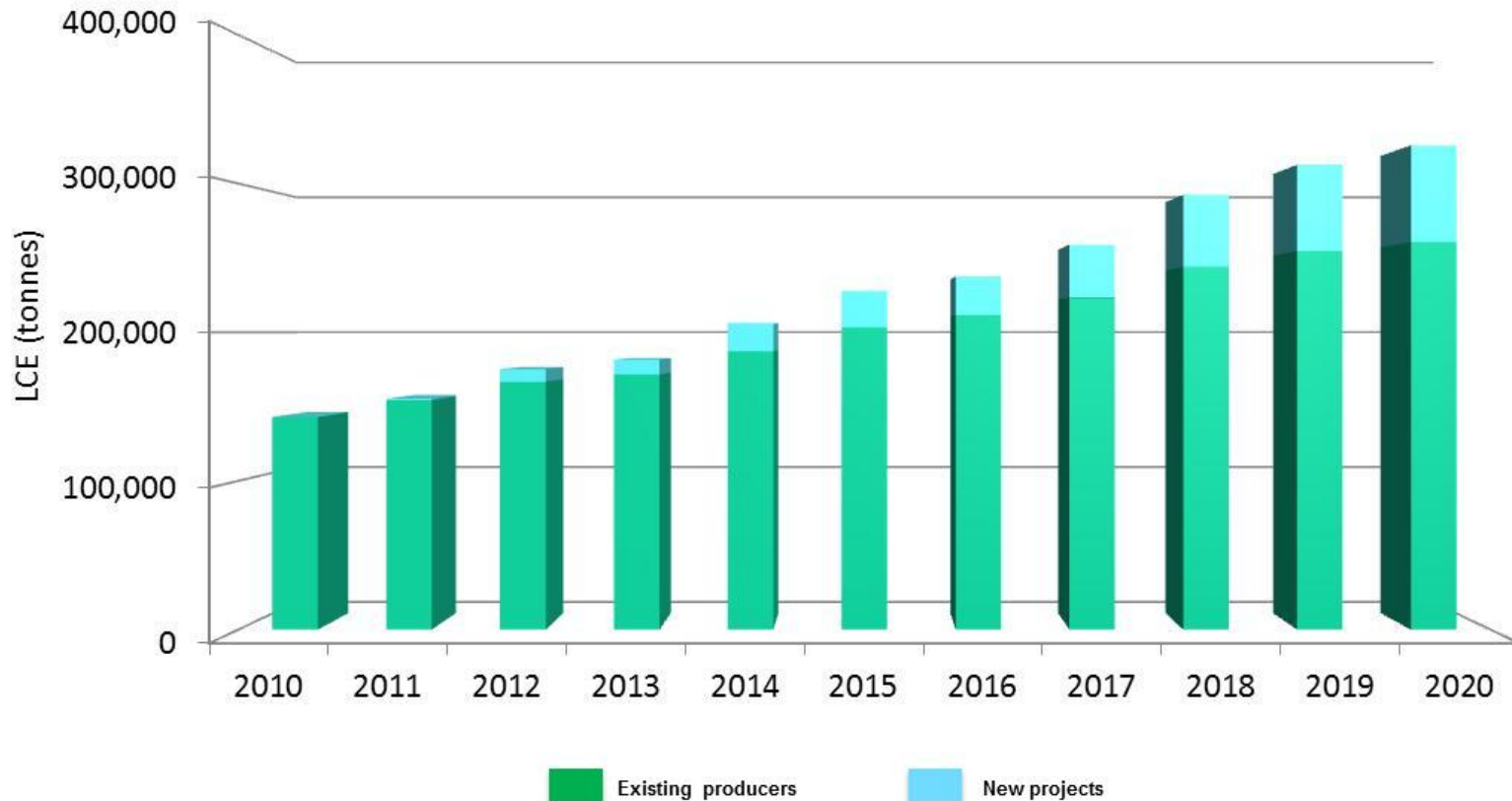


## Lithium Supply



- There is no shortage of lithium, nor a threat of depletion of lithium
- Known resources of lithium are geographically concentrated
- High-grade deposits are rare, while low-grade deposits are more common
- Current lithium supply is provided by four existing producers, with the following advantages:
  - Larger, higher grade deposits
  - Economies of scale
  - Existing infrastructure and logistics
  - Scalable operations to meet increases in demand
  - Incremental capital costs for expansion
- New lithium projects face the following challenges:
  - Smaller, lower grade deposits
  - Higher initial capital costs and operating costs
  - Technical challenges

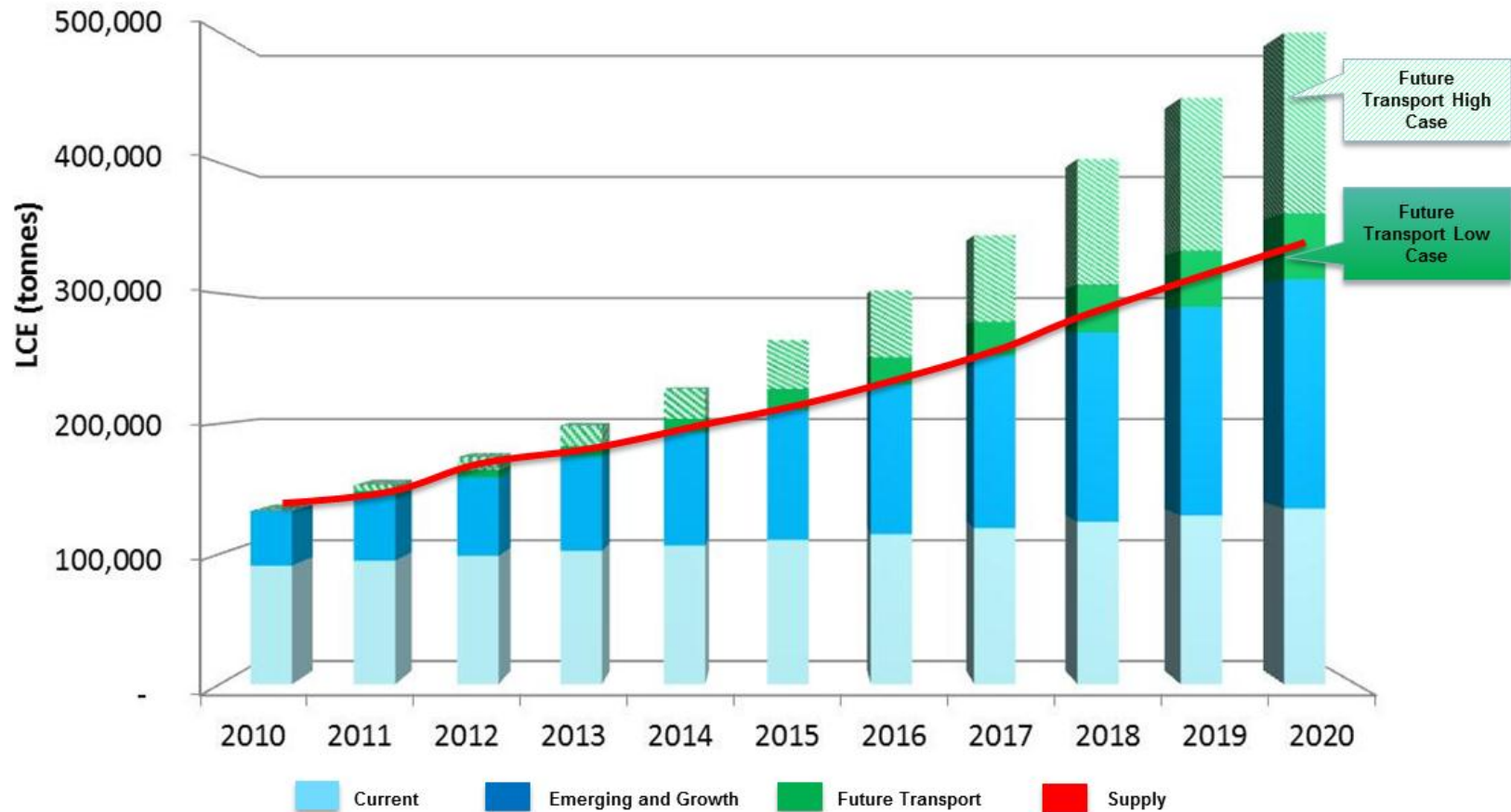
## Lithium Supply – Existing and Potential New Producers



Source: Talison Lithium



## Lithium Supply & Demand



Source: Talison Lithium

## Talison Lithium Limited



### ■ Overview

- Lithium producer for the past 25 years
- World class lithium mineral asset at Greenbushes, Western Australia
- Largest, highest grade global lithium minerals deposit
- Currently the largest global lithium producer
- Currently supplies ~1/3 of global lithium supply
- Currently supplies ~ 80% of China's lithium demand
- Lithium brine exploration assets in Chile

### ■ Talison's Supply Response

- Increase in reserve base: 22 year mine life based on current reserves
- Capacity expansion: 110,000 tpa LCE nameplate capacity as of June 2012
- Downstream expansion: 20,000 tpa LCE lithium carbonate plant in 2015